TRANSFER STAR-WHEEL, IN PARTICULAR FOR FLEXIBLE CONTAINERS, AND METHOD FOR COOLING SAID CONTAINERS.

TECHNICAL FIELD AND BACKGROUND ART.

The present invention relates to a transfer star-wheel, in particular for flexible containers, and a method for cooling said containers.

As is well known, in the sector of the production and filling of flexible containers there is a particularly acute need to transfer and cool, in the shortest possible time, the previously formed containers.

Generally, flexible containers comprise a pouch, usually made of polyethylene (PE), and a spout, able to allow the outflow of the product maintained within the container, for instance a drink or a fruit juice or other beverages.

This type of flexible container is formed starting from pouches provided with an opening, whereat a portion of the spout is inserted and secured within the pouch by sealing.

In particular, the sealing operation involves the edges of said opening and is performed by heating means which cause a partial melting of the edges themselves, causing them to adhere to the portion of the spout inserted into the pouch.

A particularly acute, and as yet unsolved, problem in the sector is the need to cool the seal area to prevent the crystallisation of the material whereof the pouch is made, to improve its mechanical resistance.

Secondly, there is a need to complete said cooling operation in the shortest possible time, to avoid any negative impacts on the efficiency of the production cycle.

DISCLOSURE OF THE INVENTION.

An object of the present invention is to eliminate the aforesaid drawbacks, making

available a transfer star-wheel, in particular for flexible containers, and a method for cooling the aforesaid containers, which are able to operate, without negatively impacting on the productivity of the line for processing the containers.

Another object of the present invention is to propose a method for cooling containers which is able to optimise the productive cycle.

An additional object of the present invention is to obtain the above results within the scope of a rational, reliable and economical technical solution.

Said objects are fully achieved by the transfer star-wheel, in particular for flexible containers, and by the method for cooling the aforesaid containers, of the present invention, which are characterised by the content of the claims set out below.

BEST MODE FOR CARRYING OUT THE INVENTION.

These and other features shall become more readily apparent from the following description of a preferred embodiment illustrated, purely by way of non limiting example, in the accompanying drawing tables, in which:

- Figure 1 shows a frontal section view of a transfer star-wheel, in particular for flexible containers;
- Figures 2, 3, 4 show three views of a constructive element associated to the transfer star-wheel shown in Figure 1, in three different operative configurations;
- Figure 5 shows a lateral view of the constructive element shown in Figure 4;
- Figure 6 shows a lateral view of a constructive detail of the transfer star-wheel shown in Figure 1.
- Figure 7 shows a plan view of the transfer star-wheel shown in Figure 1.

With particular reference to Figure 1, the transfer star-wheel according to the invention is globally designated with the number 1 and comprises a revolving platform 2 provided with a plurality of stations 3 for flexible containers, or pouch, each of which

is provided with means for gripping the containers.

In particular, the revolving platform 2 is integrally connected to a supporting and rotating shaft 5.

In absolutely new and original fashion, the transfer star-wheel 1 comprises means for cooling previously sealed portions of the containers.

In the preferred embodiment, the means for cooling the aforesaid portions of the pouch comprise a pair of jaws 9, 10 able to approach and touch the aforesaid portions to be cooled.

Said cooling means further comprise a conduit 6 for delivering a cooling fluid to the jaws 9, 10, a conduit 7 for the return of said fluid and a conduit 8 for discharging the cooling fluid, after said fluid has thermally interacted with the jaws.

In the preferred embodiment, the delivery conduit 6 and the return conduit 7 are partially contained within the support shaft 5 of the revolving platform 2. In particular, both the delivery conduit 6 and the return conduit 7 comprise at least a part defined by flexible tubular bodies 6a, 7a, positioned externally to the support shaft 5.

In the illustrated example, the flexible tubular bodies 6a, 7a are directly connected to the jaws.

With particular reference to Figure 1, a first jaw 9 is fixed, whilst a second jaw 10 is movable away from the first one, in order to allow an insertion, between the jaws, of the sealed portions of a container.

In the preferred embodiment, each jaw 9,10 has a recessed portion, substantially concave, shaped complementarily to a convexity of the container present at the sealed portions. Said convexity is determined by the presence of a spout portion 4, embedded between the sealed edges of the container, as described in the prior art.

The star-wheel 1 comprises means for actuating the second jaw 10 to move it away

from the first jaw 9.

In the preferred and illustrated embodiment, said actuating means comprise a plurality of rod-like elements 11, 12, 13 kinematically connected to each other to define substantially an articulated quadrilateral. In particular, the rod-like elements 11, 12 are hinged on an appendage 30 integrally connected to the fixed jaw 9, whilst the second jaw 10 is connected to at least one of the aforesaid rod-like elements 11, 12, 13.

The actuating means further comprise a cursor 14 slidably movable with reciprocating motion along a support guide 15, positioned on the revolving platform 2 at a pre-set distance from the support shaft 5.

Also present is a connecting rod 16 having a first end 16a connected to one of said rod-like elements 11, 12, 13 (specifically to the rod-like element designated by the number 13) and a second end 16b connected to the cursor 14.

The means for actuating the second jaw 10 further comprise a second guide 17 positioned around the support shaft 5 of the revolving platform 2 and within which is engaged a roller 18 pivotally engaged to the cursor 14. The guide 17 is substantially a desmodronic guide.

In the preferred and illustrated embodiment, the means for gripping the containers comprise a pincer 19 located on the support guide 15 and positioned on the revolving platform 2 at a pre-set distance from the support shaft 5.

In particular, the star-wheel 1 comprises means for moving each pincer 19 in a direction that is substantially radial to the revolving platform 2.

With particular reference to Figures 1 through 5, the means for moving each pincer 19 in the radial direction comprise a sliding seat 20 for a frame 21 of the pincer and a discoidal body 22, connected to the support shaft 5 and having a groove 23 which substantially defines a cam.

The means for moving each pincer 19 further comprise a roller 24 connected to the frame 21 of the pincer and slidably housed in the groove 23 present on the discoidal body 22.

The operation of the invention is as follows.

The containers are picked up from a forming and sealing station by means of the pincers 19.

Subsequently, the pincers 19 move rearwards in the radial direction towards the support shaft 5, by effect of the rotation of the platform 2 and of the simultaneous sliding of the roller 24 of the frame 21 of each pincer within the groove 23. In this way, the just sealed portions of the containers come in contact with the fixed jaw 9.

Simultaneously, the movable jaw 10, initially far from the fixed jaw 9 to allow the pincers to grab the container, is approached to the latter by effect of the vertical and upwards motion of the cursor 14 along the support guide 15.

Said movement of the cursor 14 is caused by the rotation of the platform 2 and by the simultaneous sliding of the roller 18 inside the guide 17, which is of the desmodronic type.

With particular reference to Figure 1, the movement of the cursor 14 thrusts the connecting rod 16 upwards, determining the rotation of the articulated quadrilateral constituted by the rod-like elements 11, 12, 13.

The movable jaw 10 is moved away simply by inverting the direction of motion of the cursor 14, by means of an appropriate geometry of the desmodronic guide 17.

After positioning the sealed portions of the container between the jaws 9, 10, the cooling fluid, which circulates within the jaws, interacts thermally therewith, cooling said sealed portions.

The cooling fluid is sent to the jaws through the delivery conduit 6, 6a and it exits

therefrom through the return conduit 7, 7a, which sends it to a discharge conduit 8.

The method for cooling flexible containers, of the present invention, comprises the steps of:

- collecting the flexible containers at the output of a first station for forming and sealing the containers;
- transferring the flexible containers from said first station to a second processing station.

In absolutely new and original fashion, the method is characterised in that it comprises a step of forced cooling of the flexible containers simultaneously with the step of transferring the containers.

In particular, the cooling step occurs by means of indirect heat exchange with a cooling fluid, preferably water at a temperature within a range of about 12°C to 20°C.

The invention achieves important advantages.

First of all, a transfer star-wheel and a method according to the invention allow to optimise the productivity of an installation.

Another advantage of the present invention is given by the fact that cooling the sealed portions allows to prevent the crystallisation of polyethylene, thereby improving the mechanical characteristics of the containers and safeguarding their integrity.

Advantageously, a transfer star-wheel in accordance with the invention solves the problem of cooling the flexible containers in an extremely rational and reliable manner.

CLAIMS

1. Transfer star-wheel (1), in particular for flexible containers, comprising:

at leást a revolving platform (2);

a plurality of stations (3) for the containers positioned on said platform (2), each of which is provided with means for gripping the containers;

a shaft (5) for supporting the revolving platform (2),

characterised in that it comprises means for cooling previously sealed portions of the containers.

2. A transfer star-wheel as claimed in claim 1, characterised in that said means for cooling previously sealed portions of the containers comprise:

at least a pair of jaws (9,10) for gripping said portions of the containers;

at least a conduit (6,6a) for delivering a cooling fluid to at least one of said jaws (9,10);

at least a conduit (7,7a) for returning the cooling fluid from said jaw (9,10);

at least a conduit (8) for discharging the cooling fluid after it has thermally interacted with at least one jaw (9,10).

3. A transfer star-wheel as claimed in claim 2, characterised in that said pair of jaws (9,10) comprises a first fixed jaw (9) and a second jaw (10), movable away from the first one, to allow an insertion of the sealed portions of a container between said jaws (9,10).

4. A transfer star-wheel as claimed in claim 3, characterised in that it comprises means for actuating said second jaw (10) to move it away from the first one.

5. A transfer star-wheel as claimed in claim 4, characterised in that said actuating means comprise:

a plurality of rod-like elements (11,12,13) kinematically connected to each other

in order substantially to define an articulated quadrilateral, two of said rod-like elements (11,12,13) being pivotally connected to an appendage (30) integrally connected to said fixed jaw (9), the second jaw (10) being connected to at least one of the rod-like elements (11,12,13);

at least a cursor (14) slidably movable with reciprocating motion along a support guide (15), positioned on the rotating platform (2) at a pre-set distance from the support shaft (5);

at least a rod (16) having a first end (16a) connected to at least one of the rod-like elements (11,12,13) pivotally connected to the appendage (30) and a second end (16b) connected to said cursor (14);

a second guide (17), serving substantially as a cam, positioned around the support shaft (5) of the revolving platform (2) and operatively active on a roller (18) pivotally engaged to said cursor (14).

6. A transfer star-wheel as claimed in claim 2, characterised in that said delivery conduit (6,6a) and said return conduit (7,7a) are at least partially contained within said support shaft (5) of the revolving platform (2).

7. A transfer star-wheel as claimed in claim 6, characterised in that the delivery conduit (6,6a) is at least partially defined by a flexible tubular body (6a) positioned externally to the support shaft (5) of the revolving platform (2).

8. A transfer star-wheel as claimed in claim 6, characterised in that the return conduit (7,7a) is at least partially defined by a flexible tubular body (7a) positioned externally to the support shaft (5) of the revolving platform (2).

9. A transfer star-wheel as claimed in claim 1, characterised in that the gripping means comprise at least a pincer (19) positioned on the revolving platform (2) at a pre-set distance from the support shaft (5).

10. A transfer star as claimed in claim 9, characterised in that it comprises means for moving each pincer (19) in a radial direction.

11. A transfer star as claimed in claim 10, characterised in that said means for moving each pincer (19) in a radial direction comprise:

at least a sliding seat (20) for a frame (21) of the pincer (19);

a discoidal body (22) connected to the support shaft (5) and having at least a groove (23) substantially defining a cam;

at least a roller (24) connected to the frame (21) of the pincer (19) and slidably housed in said groove (23) present on the discoidal body (22).

12. A transfer star as claimed in claim 2, characterised in that the delivery conduit (6,6a) and the return conduit (7,7a) are directly connected to at least one of said jaws (9,10).

13. A method for cooling flexible containers, comprising the steps of:

collecting the flexible containers at the output of a first station for forming and sealing the containers;

transferring the flexible containers from said first station to a second processing station,

characterised in that it comprises a step of forced cooling of the flexible containers simultaneously with said step of transferring the containers.

14. A method as claimed in claim 13, characterised in that said cooling step occurs by indirect heat exchange with a cooling fluid.

15. A method as claimed in claim 14, characterised in that said cooling fluid is water at a temperature within a range of about 12°C to 20°C.

16. An installation for filling flexible containers, comprising:

at least a star-wheel for forming the flexible containers, by sealing portions

thereof;

at least a star-wheel for filling the flexible containers;

at least a transfer star-wheel for transferring the formed containers, from the forming star-wheel to the filling star-wheel,

characterised in that said transfer star-wheel comprises means for cooling the previously cooled portions of the containers.

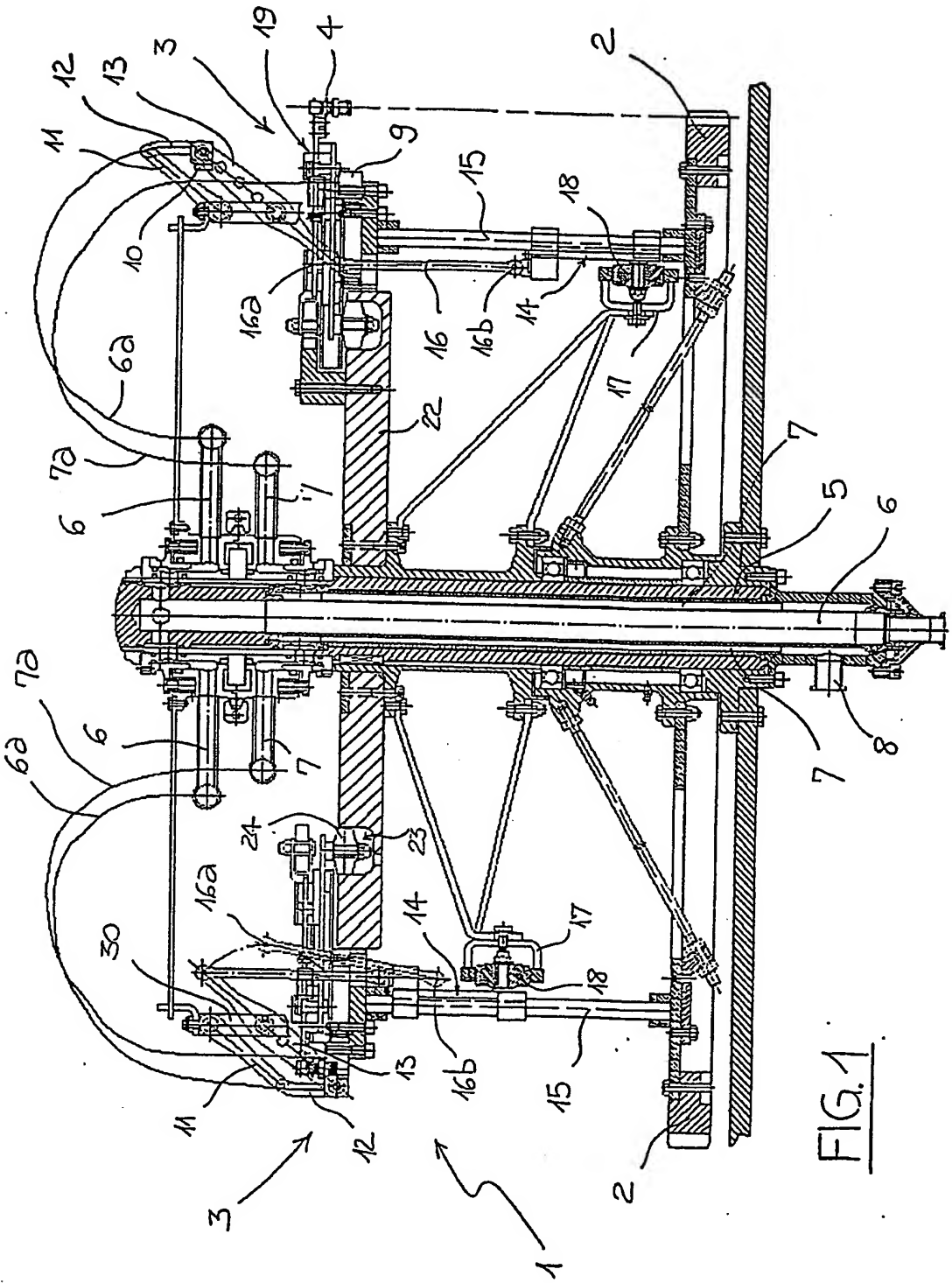
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FIG.1

FIG.5

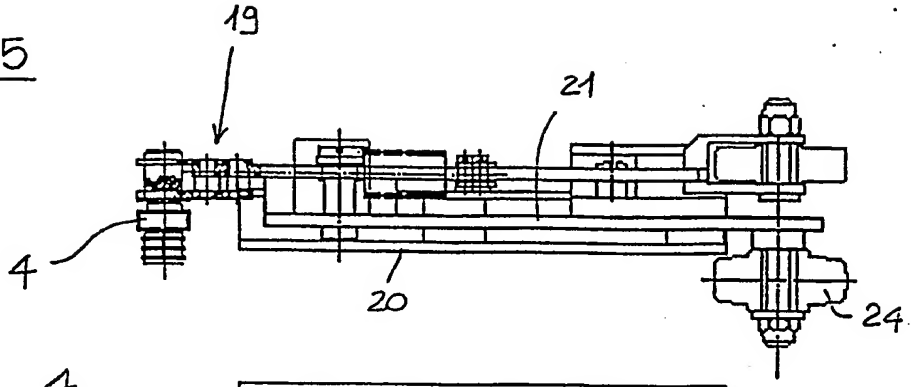
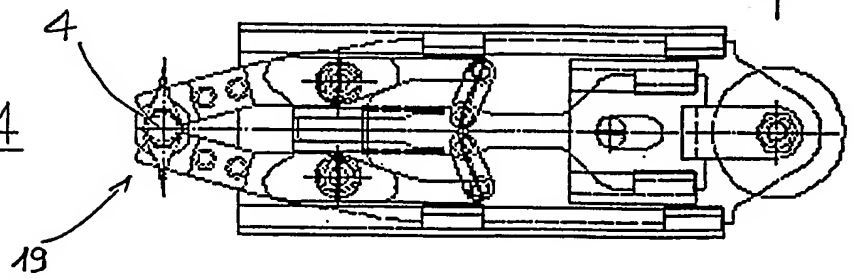


FIG.4



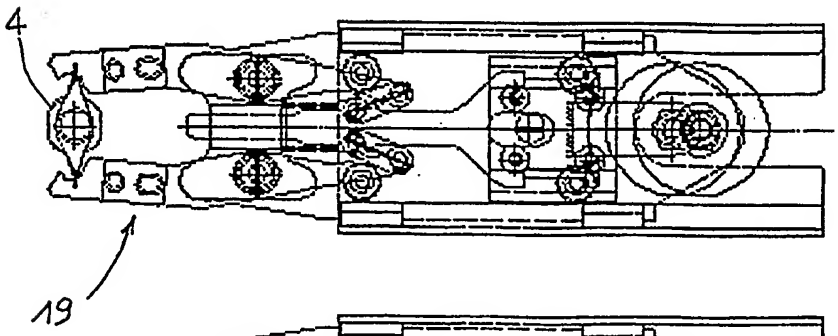


FIG.2

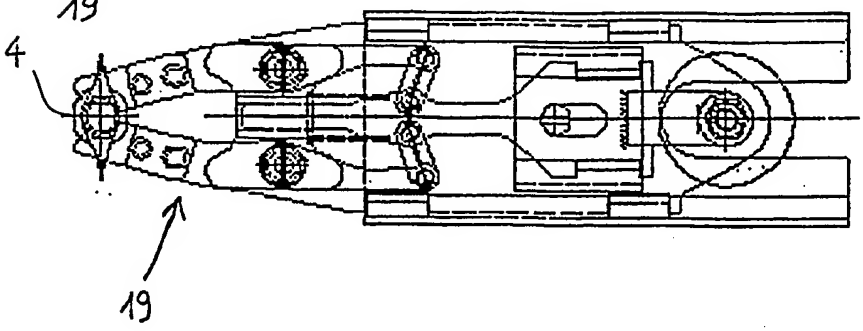


FIG.3

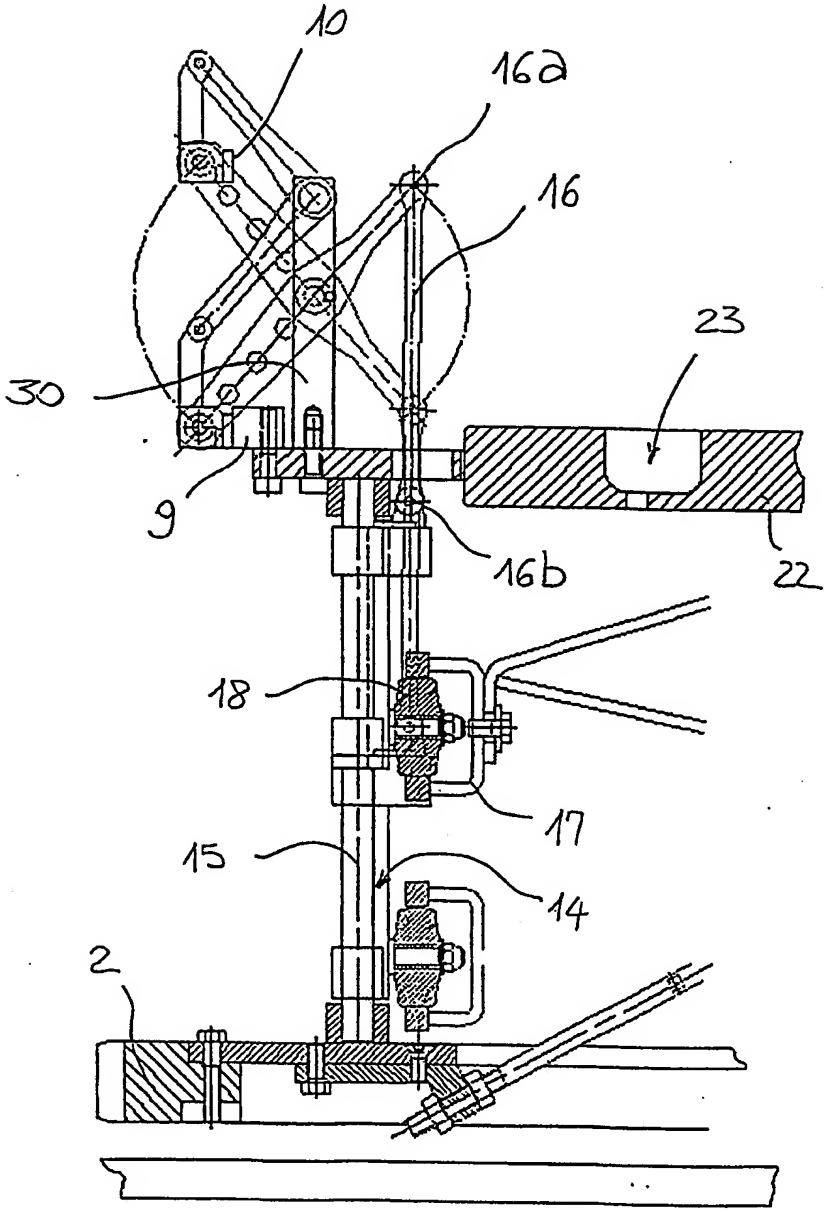


FIG.6

FIG.7